

Test Advisor: A pen-based computer program for Bayesian decision-making in the clinical setting

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Bayesian decision-making is a potentially powerful tool for physicians. However, it requires calculation, and access to detailed information about pre-test probability of disease and test characteristics which may not be readily available.

A pen-based computer program (Test Advisor) has been written for the Microsoft Windows environment which helps physicians apply Bayesian decision-making to the care of their patients. It uses patient-specific data to help physicians select the best test for a patient's medical problem.

The computer program was written in Visual Basic Professional for Windows v. 3.0. This is a visual programming language with built-in support for database access, graphics, and pen input. The program stores information about pre-test probabilities, test characteristics, and the interface itself in a relational database. This information can be updated or changed by the user. In fact, because information about the interface is stored in the database, entirely new patient problems and their associated data can be entered by the end-user.

The basic interface is shown in Figure 1. The user begins by selecting the patient problem from the pull down list at the top of the screen. After a problem is selected, the mid-section of the interface is drawn based on the patient characteristics needed to calculate the pre-test probability. In the example of "Chest pain - is it CAD?", the program requests information about the patient's age, gender, and the type of chest pain they are experiencing.

At the bottom of the screen a list of possible tests is shown. The user can select one or more tests. When they press the <Calculate post-test probability> button, a bar graph is shown which helps them choose the test (Figure 2). The graph, while simple, provides the user with a great deal of information. For each test, the left edge represents the post-test probability for a negative test; the transition between colors at the middle of the bar the pre-test probability; and the right edge the post-test probability for a positive test. Cost is also shown to the left of each bar.

Figure 1. User interface

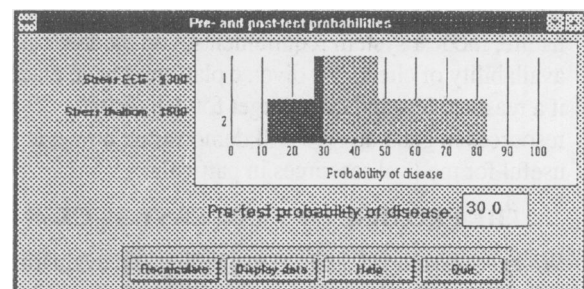


Figure 2. Output, showing cost, pre-test probability, and post-test probability for positive (right edge) and negative (left edge) tests.

Future work will involve expanding the number of problems addressed by the software, and rewriting it for other computer platforms. Currently these efforts are focused on the WinPad environment, an extension of the Microsoft Windows operating system designed for handheld, pen-based computers. Similar to the Apple Newton, these personal digital assistants (PDA's) will be especially useful for highly mobile professionals such as nurses, physicians, and mid-level providers.